

Appl. No. 09/823,813

Request for Reconsideration. Dated November 18, 2003

Reply to Final Office action of September 18, 2003

Remarks/Arguments

The Examiner is thanked for his careful review of this application. Claims 17-31 are pending after entry of the present Amendment. Claims 1-16 were previously cancelled.

Rejections under 35 U.S.C. § 103:

The Office has rejected claims 17-19 and 22 under U.S.C. 103(a), as being unpatentable over Patent Abstract of Japan 63-253627 (Japan '627) in view of either Patent Abstract of Japan 11-24282 (Japan '282) or Patent Abstract of Japan 9-293658 (Japan '658). The Office has further rejected claim 21 under 35 U.S.C. 103(a) as being unpatentable over the Japan '627 in view of either Japan '282' or '658, further in view of EPO 11238713 (EPO '713). In a like manner, the Office has rejected claims 17-19, 21, and 22 under 35 U.S.C. 103(a) over either Patent Abstract of Japan 7-335599 (Japan '599), Patent Abstract of Japan 5-1384 (Japan '184), EPO '713, United States Patent 5,868,866 to Maekawa et al. (hereinafter "Maekawa"), United States Patent 6,543,080 to Tomita et al. ("Tomita"), or United States Patent 6,248,009 to Ito et al. ("Ito") in view of Japan '627. (The Office has also referred to a United States Patent having the inventors Sawada et al., however, neither the patent number nor the actual reference was provided to Applicant. As Applicant cannot locate the Sawada et al. reference without the Patent Number, Applicant assumes that the Sawada et al. reference was referred to by the Office inadvertently.)

For the claimed invention to be obvious in view of the combination of prior art, the prior art must suggest the desirability and the obviousness of making the combination proposed by the Office. *Uniroyal, Inc. v. Rudkin-Wiley Corp.*, 837 F.2d 1044, 5 USPQ2d 1434, 1438 (CAFC 1988). Additionally, the mere fact that the structure of a primary prior art reference could be modified in view of secondary prior art references to form the claimed structure would not make the modification obvious unless the prior art suggested the desirability of the modification. *In re Laskowski*, 871 F.2d 115, 10 USPQ2d (BNA) 1524 (Fed. Cir. 2002).

Citing to Japan '627, the Office acknowledges that Japan '627 does not teach using an enclosure. The Office then cites to Japan '658 or '282, asserting that it would have been obvious to modify the apparatus of '627 by including the enclosure of Japan '658 or '282.

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As will be explained below, the claimed invention, as defined in independent claim 17, is not obvious in view of any of the combinations of prior art, as asserted by the Office. Japan '627 teaches an apparatus for manufacturing semiconductors in which photoresist material defined on the flat part of a semiconductor wafer is removed. The apparatus includes a base having a slanted top (supporting surface) wherein the wafer floats. While floating, the wafer sits on three rollers defined on the slanted top as a result of gravity.

The next reference, Japan '658, teaches a method for spinning a liquid on the wafer in which the wafer is being rotated in a horizontal position by a spin chuck. Then, the chuck and the wafer stop rotating and the rotating chuck is tilted. Edge rinsing liquid is poured onto the edge of the wafer so as to remove the coating film from the OF of the wafer.

Applicant respectfully submits that the teachings of Japan '282 cannot be determined, as only the Japanese version of the reference has been provided. However, assuming that the Office's assertion that Japan '282 teaches an enclosure (a proposition with which Applicant can neither confirm or deny), the alleged enclosure in Japan '282 would not have cured any of deficiencies pointed out below with respect to Japan '627.

At the outset, Japan '627 or Japan '658 teach apparatus for manufacturing semiconductor devices and spinning on liquid onto the surface of the wafer while the claimed invention defines a wafer preparation module. Preparation of a wafer can involve rinsing, cleaning, drying, scrubbing, and megasonic fluid application while the specific focus in Japan '627 and '658 is on manufacturing the semiconductor device. It is submitted that one having ordinary skill in the art, reading the teachings of Japan '627 or Japan 658 would not have been motivated to modify a wafer manufacturing apparatus directed to perform specific tasks so as to create specific structures in semiconductors so as to arrive at a wafer preparation module with engaging rollers oriented at an angle.

Furthermore, in Japan '627, the wafer is being supported by a stationary base having a slanted top supporting surface. The wafer is placed on the supporting surface such that three rollers disposed on the supporting surface about the wafer. As a result, the wafer and the three rollers are defined at an angle. However, the rollers in Japan '627 do not engage the wafer. Rather, rollers in Japan '627 merely about the wafer so that the rotation of the rollers can cause the wafer to rotate. More importantly, as the wafer rotates from one of the two closely defined rollers to the other, the center position of the wafer is changed so that photoresist material

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defined at the edge of the wafer adjacent to the rollers can be removed. Thus, to be able to rotate the wafer and allow the center position of the wafer to be changed, the wafer cannot be engaged by the rollers. Particularly, the supporting surface is defined at an angle so that gravity causes the wafer to come into contact with the two closely defined rollers. Changing the center position of rotation of the wafer is important in Japan '627 so that the photoresist material defined at the edge of the wafer adjacent to the rollers can be removed. It must be noted that if the rollers were to be modified so as to engage the wafer, the function of changing the center position of the wafer during rotation cannot be achieved.

The Office, however, has not addressed that the rollers in Japan '627 are not engaging rollers. Rather, the Office has assumed that the rollers in Japan '627 are engaging rollers and has focused on Japan '627 not including enclosure. Furthermore, Japan '658 teaches that the wafer should be held in the horizontal plane while spinning on the liquid. However, once the supporting chuck and thus the wafer are tilted for the purpose of dropping edge cleaning liquid, the wafer should not be spinning. As a result, the combination of Japan '627 and '658 would not have taught spinning or preparing the wafer while the wafer is oriented at an angle and is being prepared. Additionally, as can be seen, Japan '282 does not include engaging rollers or engaging the wafer at an angle.

It is further submitted that the combination of Japan '627 in view of either Japan '282' or '658, further in view of EPO '713 would not have rendered the claimed invention obvious as EPO '713 does not teach, suggest, or motivate orienting the wafer at an angle between 0 to 90 degrees, as defined in amended claim 17. First, defining the wafer at an angle goes against the teachings of EPO '713 wherein the wafer is taught to be held horizontally. Furthermore, the rotation guide member 2 of EPO '713 is not an engaging roller. Rather, the rollers merely rotate the wafer in the horizontal direction. Thus, even if the rotation guiding members of EPO '713 were to be used in Japan '627, the wafer would not have been engaged and engaging rollers of the claimed invention would not have been achieved.

It is further submitted that independent claim 17 is not obvious over Japan '599, Japan '184, EPO '713, Maekawa, Tomita, or Ito in view of Japan '627. As explained in more detail above, Japan '627 teaches an apparatus for manufacturing semiconductor devices and spinning on liquid onto the surface of the wafer while the claimed invention defines a wafer preparation module. It must be noted, however, that Japan '599, Japan '184, EPO '713, Maekawa, Tomita, or Ito are not directed at an apparatus for manufacturing semiconductor devices. Rather, such

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references are directed at different area of the art, cleaning the wafer surfaces. As such, one having ordinary skill in the art would not have been motivated to modify an apparatus implemented for cleaning a wafer using the teachings of an apparatus used for manufacturing the semiconductor wafers to arrive at the claimed invention.

Applicant submits that as the Japanese version of the Japan '599 has been provided, Applicant cannot determine the invention taught in Japan '599. The Office, however, has cited to Japan '599 as disclosing a wafer preparation module containing rollers designed to spin the wafer during preparation. It is submitted that even if Japan '599 discloses a wafer preparation module containing rollers (a proposition with which applicant can neither agree or disagree), Japan '599 in view of Japan 627 would not have taught or suggested the claimed invention. Specifically, as shown in the drawings in Japan '599, the wafer is held by the chuck or the rollers horizontally. As such, Japan '599 would not have suggested changing the orientation of the wafer.

Furthermore, as can be seen in Figure 2 of Japan '599, the apparatus includes multiple stations and cassettes as well as machinery to transfer the wafer. As such, changing the orientation of the rollers in one station, results in major restructuring of all the remaining stations (e.g., the angle of delivery, angle of cassettes, etc.). Accordingly, one of ordinary skill in the art would not have been motivated to redefine the chuck of Japan 599 to include rollers oriented at an angle and preparing the wafer at an angle.

Likewise, the combination of Japan '184 and Japan '627 would not have taught or suggested the claimed invention as Japan '184 teaches cleaning a backside of the wafer using brushes while the wafer is held in the horizontal orientation with rollers. Again, orienting the wafer and the rollers at an angle and preparing the wafer at an angle requires that the orientation of the chuck, the brush, and nozzles to be modified. Still further, changing the orientation of the rollers and the wafer can prevent the wafer surface from being cleaned as the liquid being sprayed on the wafer surfaces is being introduced so that merely one half of the moving wafer is cleaned. Thus, if the orientation of the wafer were to be changed, the angle of the wafer and gravity can cause liquid to flow down. As a result, different levels of cleanliness may be achieved as liquid cannot remove particulates as effectively from wafer surfaces. Additionally, Japan '627 does not teach engaging the wafer with rollers and preparing the wafer, as defined in claim 17. Rather, the wafer is merely held by the rollers. Thus, change of orientation and gravity may hinder maintaining of the wafer in place.

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Maekawa teaches an apparatus for cleaning a thin disk in which six rollers provided on six spindles are pressed against a wafer. Two of the rollers cause the wafer to rotate while the remaining rollers act as bearing to support the rotating semiconductor. See column 7, lines 49-53. The combination of Maekawa and Japan '627 would not have taught or suggested the claimed invention because the rollers in Maekawa and the wafer are specifically taught to be defined in the horizontal orientation.

Furthermore, the rollers in Maekawa, similar to the rollers in Japan '627, are not engaging rollers. Pressing against the wafer or acting as bearings is not equivalent to engaging the wafer. By way of example, if the rollers of Maekawa are defined at an angular orientation, as suggested by the Office using Japan '627, the rollers acting as bearings can no longer support the wafer in the angular orientation due to the gravity (e.g. the wafer can flip). Additionally, without engaging the wafer, the rollers in Maekawa cannot stop the wafer from flying out as the wafer spins in the angular orientation. Thus, the combination would not have suggested the claimed invention.

In a like manner, Tomita teaches a wafer cleaning apparatus that includes four rollers engaging the wafer in the horizontal plane and cleaning the wafer in the horizontal plane. Again, as Tomita specifically teaches defining the rollers and the wafer in the horizontal plane. Furthermore, in contrast to the Office's assertion, in Tomita, to orient the wafer and the rollers in an angular orientation must take into account the effect of gravity on the wafer as well as the cleaning solution being introduced onto the front and backside of the wafer. For instance, the level of cleaning may differ depending on introducing the liquid from the side of the wafer being defined at a lower level compare to the horizontal plane than the side of the wafer defined at the higher level. Still further, Tomita does not teach or suggest using an enclosure.

Lastly, Ito teaches a substrate cleaning apparatus wherein the wafer is maintained in the horizontal orientation while being cleaned. As can be seen in Figure 1, the wafer is delivered from a loading station to the cleaning station and polishing station, all of which are configured to receive the wafer in the horizontal orientation. In view of repeated references to keeping the wafer and processing the wafer in the horizontal orientation, one of ordinary skill in the art would not have been motivated to go against the specific teachings of the reference and define the rollers and the wafer in an angular orientation. Furthermore, reorienting the wafer may require reorienting all the other components defined in the cleaning apparatus.

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Therefore, it is respectfully submitted that independent claim 17 is patentable under 35 U.S.C. § 103(a) over any combination of the cited prior art. In a like manner, dependent claims 17-19, 21, and 22 which incorporates each and every element of the independent claim 17 is patentable under 35 U.S.C. § 103(a) over any combination of the cited prior art for at least the same reasons discussed above.

Indication of Allowability:

Applicant acknowledges the Office's confirmation that claims 23-31 are allowed.

Applicant hereby submits that this Request for Reconsideration complies with 37 C.F.R. 1.116(b) and should be entered.

In view of the foregoing, Applicant respectfully submits that all of the pending claims 17-19, 21, and 22 are in condition for allowance. Accordingly, a Notice of Allowance is respectfully requested. If the Examiner has any questions concerning the present Preliminary Amendment, the Examiner is kindly requested to contact the undersigned at (408) 749-6900, ext. 6913. If any additional fees are due in connection with filing this Amendment, the Commissioner is also authorized to charge Deposit Account No. 50-0805 (Order No. LAM2P247). A duplicate copy of the transmittal is enclosed for this purpose.

Respectfully submitted,

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By: **CFY:kh** Filing Date: **March 30, 2001** Express Mail No.:
Inventor: **R. Treur**
Title: **ANGULAR SPIN, RINSE, AND DRY MODULE AND METHODS FOR
MAKING AND IMPLEMENTING THE SAME**

The following has been received in the U.S. Patent & Trademark Office on
the date stamped below:

- Amendment Transmittal Sheet (1 page, in duplicate)
- Request for Reconsideration (12 pages)

